4.2.2.9 Public and Occupational Health and Safety

The assessments of potential radiological and chemical impacts associated with the storage alternatives at NTS are presented in this section. Summaries of radiological impacts from normal operations are presented in Tables 4.2.2.9–1 and 4.2.2.9–2 for the public and workers, respectively. Impacts from hazardous chemicals are presented in Table 4.2.2.9–3. Summaries of impacts associated with postulated accidents are given in Tables 4.2.2.9–4 through 4.2.2.9–7. Detailed results are presented in Appendix M.

Preferred Alternative: No Action Alternative

This section describes the radiological and hazardous chemical releases and their associated impacts resulting from normal operations involved with the sitewide NTS missions. The radiological and chemical source terms (releases) under the No Action Alternative are taken to be the same as for the existing baseline condition; the resulting impacts would be within applicable regulatory limits. For facility accidents, the risks and consequences are described in site safety documentation.

Normal Operation. The doses and potential health effects on the public and workers during normal operations are described below.

Radiological Impacts. The calculated annual dose to the average and maximally exposed members of the public from total site operation; the associated fatal cancer risks to these individuals from 50 years of operation; the dose to the population within 80 km (50 mi) from total site operation in the year 2030; and the projected number of fatal cancers in this population from 50 years of operation are presented in Table 4.2.2.9–1 under this alternative at NTS. The annual dose of 4.2×10^{-3} mrem to the MEI is within the radiological limits specified in NESHAPS (40 CFR 61, Subpart H) and DOE Order 5400.5. From 50 years of operation, the corresponding risk of fatal cancer to this individual would be 1.0×10^{-7}. This activity would be included in a program to ensure that doses to the public are ALARA. The annual dose of 3.7×10^{-3} person-rem to the population would be within the limit in proposed 10 CFR 834. The corresponding number of fatal cancers in this population from 50 years of operation would be 9.3×10^{-5}. To put operational doses into perspective, comparisons with doses from natural background radiation are included in the table.

Under the No Action Alternative, as shown in Table 4.2.2.9–2, the annual average dose to a noninvolved (No Action) site worker and the annual dose to the noninvolved (No Action) total site workforce would be 5.0 mrem and 3.0 person-rem, respectively. The associated risk of fatal cancer to the average worker from 50 years of total site operations would be 1.0×10^{-4} and the projected number of fatal cancers among all workers from 50 years of total site operations would be 0.060.

Hazardous Chemical Impacts. There would be no hazardous chemical impacts shown in Table 4.2.2.9–3 on the public or to workers resulting from the normal operation under No Action at NTS because no hazardous or other carcinogens are released.

Facility Accidents. Under the No Action Alternative, facilities would continue to operate in accordance with DOE safety orders, which ensure that the risk to the public of prompt fatalities due to accidents or cancer fatalities due to operations will be minimized. The safety to workers and the public from accidents at existing facilities is also controlled by Technical Safety Requirements specified in detail in SARs or a Basis for Interim Operations document prepared and maintained specifically for a facility or process within a facility. Under these controls, any change in approved operations or to facilities would cause a halt in operations until it can be established that worker and public safety has not been compromised.

Earthquakes offer the greatest threat from natural phenomena. Available seismology studies indicate that active faults such as the Mine Mountain Fault, the Carpetbag Fault, the Yucca Flat Fault, and the Cane Spring Fault in the NTS vicinity are capable of generating earthquakes of up to 0.85 g (PX DOE 1996b:5-16). NTS has a natural background seismicity. The Cane Springs Fault, located 5 to 8 km (3 to 5 mi) south-southeast of the DAF area, has been identified as the most significant feature from the standpoint of seismic risk. However, a large portion of seismic events occurring near NTS may have been aftershocks from past nuclear explosions. The proposed storage area in P-Tunnel is only a few hundred feet away from the site of some past nuclear explosions. Since the P-Tunnel has survived these explosions without noticeable degradation, it is not reasonably foreseeable that the proposed storage area would be damaged by an earthquake. However, if the P-Tunnel collapses, the impact forces could breach some containers. The collapse would also seal the containers inside the tunnel, resulting in no or minimal short-term releases to the environment. Thus, the consequences to the public and workers are considered negligible.

Consolidation Alternative

This section includes a description of radiological and hazardous chemical releases and their associated impacts resulting from either normal operation or accidents involved with the new material handling building and modified P-Tunnel drifts and with the new consolidated Pu storage facility at NTS.

Normal operation under either consolidated storage option would result in impacts that are within applicable regulatory limits.

[Text deleted.]

Modify Existing Tunnel Drifts and Construct New Material Handling Building at the P-Tunnel

Normal Operation. There would be no radiological releases during the construction of a new material handling building or from modifying P-Tunnel drifts at NTS. Construction worker exposures to material potentially contaminated with radioactivity (for example, from construction activities involved with existing contaminated soil) would be limited to assure that doses are maintained ALARA. Toward this end, construction workers would be monitored as appropriate. Limited hazardous chemical releases are anticipated as a result of construction activities. However, concentrations would be within the regulated exposure limits. During normal operation, there would be both radiological and hazardous chemical releases to the environment as well as direct in-plant exposures. The resulting doses and potential health effects to the public and workers at NTS are described below.

Radiological Impacts. The radiological impacts to the public resulting from the normal operation of the modified P-Tunnel and the associated handling building are given in Table 4.2.2.9–1. The dose to the MEI due to annual storage operation in the P-Tunnel drifts and handling building would be 5.6×10^{-6} mrem. From 50 years of operation, the corresponding risk of fatal cancer to this individual would be 1.4×10^{-10}. The impacts to the average individual would be less. As a result of storage operations in the year 2030, the population dose would be 1.7×10^{-6} person-rem. The corresponding number of fatal cancers in this population due to 50 years of operation would be 4.3×10^{-8}.

The dose to the MEI of the public due to annual total site operations is within the radiological limits specified in NESHAPS (40 CFR 61, Subpart H) and DOE Order 5400.5, and would be 4.2×10^{-3} mrem. From 50 years of operation, the corresponding risk of fatal cancer to this individual would be 1.0×10^{-7}. The impacts to the average individual would be less. This activity would be included in a program to ensure that doses to the public are ALARA. As a result of total site operation in the year 2030, the population doses would all be within the limit in proposed 10 CFR 834 and would be 3.7×10^{-3} person-rem. The corresponding number of fatal cancers in this population due to 50 years of operation would be 9.3×10^{-5}.

Doses to onsite workers due to normal operations are given in Table 4.2.2.9–2. Included are involved workers directly associated with the new handling building and modified P-Tunnel drifts, workers who are not involved with the new building and modified P-Tunnel drifts, and the entire workforce at NTS. All doses fall within regulatory limits and administrative control levels. The associated risks and numbers of fatal cancers among the different workers from 50 years of operation are included in the table. For the purposes of analyses only, this PEIS assumes that TRU and TRU mixed waste would be treated onsite to the current planning-basis WIPP WAC, and shipped to WIPP for disposal. This PEIS also assumes that LLW and mixed LLW would be treated and disposed of in accordance with current site practice. Also, this analysis assumes that hazardous waste would be treated and disposed of in accordance with current site practice.

Hazardous Chemical Impacts. Hazardous chemical impacts to the public and to the onsite worker resulting from the normal operations of consolidated storage in the P-Tunnel facility and the new handling building at NTS are presented in Table 4.2.2.9–3. The impacts from all site operations, including the upgraded storage facilities, are also included in this table. Total site impacts, which include the No Action impact plus the facility impact, are provided. All analyses to support the values presented in this table are provided in Section M.3.

The HI to the MEI of the public is 2.5×10^{-6}, and the cancer risk is 4.1×10^{-9} as a result of operation of consolidated storage in the P-Tunnel facility and handling building in the year 2030. The total HI and cancer risk from hazardous chemicals would remain constant over 50 years of operation, provided exposures remain the same. The total site operation, including the consolidated facility, would result in an HI of 2.5×10^{-6} and a cancer risk of 4.1×10^{-9} for the MEI in the year 2030. This would be expected to remain constant as a result of 50 years of operation.

The HI to the onsite worker at P-Tunnel is 5.1×10^{-4}, and the cancer risk is 6.4×10^{-6} as a result of operation of consolidated storage in the year 2030. The total HI and cancer risk would remain constant over 50 years of operation, provided exposures remain the same. The total operation, including the consolidated facility, would result in an HI of 5.1×10^{-4} and a cancer risk of 6.4×10^{-6} for the onsite worker. This would be expected to remain constant as a result of 50 years of operation.

Facility Accidents. A set of potential accidents for modified P-Tunnel drifts for which there may be releases of Pu that may impact onsite workers and the offsite population has been postulated for the P-Tunnel. The accident consequences and risks to a worker located 1,000 m (3,280 ft) from the accident release point, the maximum offsite individual located at the site boundary, and the population located within 80 km (50 mi) of the accident release point are summarized in Table 4.2.2.9–4. For the set of accidents analyzed, the maximum number of cancer fatalities in the population within 80 km (50 mi) would be 5.3×10^{-4} at NTS for the truck bay fire accident scenario with a probability of 1.0×10^{-7} per year. The corresponding 50-year facility lifetime risk from the same accident scenario for the population, maximum offsite individual, and worker at 1,000 m (3,280 ft), would be 2.7×10^{-9}, 3.6×10^{-10}, and 2.1×10^{-9}, respectively. The maximum population 50-year facility lifetime risk would be 5.1×10^{-5} (that is, one fatality in about 1,000,000 years) at NTS for the PCV Penetration by Corrosion accident scenario with a probability of 0.064 per year. The corresponding maximum offsite individual and worker 50-year facility lifetime risks would be 6.9×10^{-6} and 4.0×10^{-5}, respectively. Section M.5 presents additional facility accident data and summary descriptions of the accident scenarios identified in Table 4.2.2.9–4.

Involved workers, those that would work in the facilities associated with the proposed action, may be subject to injury and, in some cases, fatality as a result of potential accidents. The locations of workstations, number of workers, personnel protective features, engineered safety features, and other design details affect the extent of worker exposures to accidents. Certain accidents such as fires, explosions and criticality could cause fatalities to workers close to the accident. Prior to construction of a new or modification of an existing facility, DOE Orders require detailed safety analyses to assure that facility designs and operating procedures limit the number of workers in hazardous areas and minimize risk of injury or fatality in the event of an accident.

Involved workers, those that would work in the facilities associated with the proposed action, may be subject to injury and, in some cases, fatality as a result of potential accidents. The locations of workstations, number of workers, personnel protective features, engineered safety features, and other design details affect the extent of worker exposures to accidents. Certain accidents such as fires, explosions and criticality could cause fatalities to workers close to the accident. Prior to construction of a new or modification of an existing facility, DOE Orders require detailed safety analyses to assure that facility designs and operating procedures limit the number of workers in hazardous areas and minimize risk of injury or fatality in the event of an accident.

Construct New Plutonium Storage Facility

Normal Operation. There would be no radiological releases during the construction of a new consolidated Pu storage facility at NTS. Construction worker exposures to material potentially contaminated with radioactivity (for example, from construction activities involved with existing contaminated soil) would be limited to assure that doses are maintained ALARA. Toward this end, construction workers would be monitored as appropriate. Limited hazardous chemical releases are anticipated as a result of construction activities. However, concentrations would be within the regulated exposure limits. During normal operation, there would be both radiological and hazardous chemical releases to the environment as well as direct in-plant exposures. The resulting doses and potential health effects on the public and workers at NTS are described below.

Radiological Impacts. Radiological impacts to the public resulting from the normal operation of the new consolidated Pu storage facility are presented in Table 4.2.2.9–1. The impacts from all site operations, including the new consolidated storage facility, are also given in the table. To put operational doses into perspective, comparisons with natural background radiation doses are included in the table.

The dose to the MEI due to annual storage facility operation would be 1.3×10^{-6} mrem. From 50 years of operation, the corresponding risk of fatal cancer to this individual would be 3.2×10^{-11}. The impacts to the average individual would be less. As a result of storage facility operation in the year 2030, the population dose would be 2.6×10^{-6} person-rem. The corresponding number of fatal cancers in this population due to 50 years of operation would be 6.5×10^{-8}.

The dose to the MEI due to annual total site operations is within the radiological limits specified in NESHAPS (40 CFR 61, Subpart H) and DOE Order 5400.5, and would be 4.2×10^{-3} mrem. From 50 years of operation, the corresponding risk of fatal cancer to this individual would be 1.0×10^{-7}. The impacts to the average individual would be less. This activity would be included in a program to ensure that doses to the public are ALARA. As a result of total site operation in the year 2030, the population dose would be within the limit in proposed 10 CFR 834 and would be 3.7×10^{-3} person-rem. The corresponding number of fatal cancers in this population due to 50 years of operation would be 9.3×10^{-5}.

Doses to onsite workers from normal operations are given in Table 4.2.2.9–2. Included are involved workers directly associated with the new consolidated Pu storage facility, workers who are not involved with the storage facility, and the entire workforce at NTS. All doses fall within regulatory limits and administrative control levels. The associated risks and numbers of fatal cancers among the different workers from 50 years of operations are included in the table.

Hazardous Chemical Impacts. Hazardous chemical impacts to the public and to the onsite worker resulting from the normal operations of the consolidated storage facilities at NTS are presented in Table 4.2.2.9–3. The impacts from all site operations, including the new consolidated storage facilities are also included in this table. Total site impacts, which include the No Action impact plus the facility are provided. All analyses to support the values presented in this table are provided in Section M.3.

The HI to the MEI of the public is 2.3×10^{-6}, and the cancer risk is 4.1×10^{-9} as a result of operation of the consolidated storage facilities in the year 2030. The HI and cancer risk from hazardous chemicals would remain constant over 50 years of operation, because exposures would be expected to remain the same. The total site operation, including the consolidated facility, would result in an HI of 2.3×10^{-6} and a cancer risk of 4.1×10^{-9} for the MEI in the year 2030. This would be expected to remain constant as a result of 50 years of operation.

The HI to the onsite worker would be 4.7×10^{-4}, and the cancer risk is 6.4×10^{-6} as a result of operation of the consolidated storage facilities in the year 2030. The HI and cancer risk would remain constant over 50 years of operation, because exposures would be expected to remain the same. The total site operation, including the consolidated facility, would result in an HI of 4.7×10^{-4} and a cancer risk of 6.4×10^{-6} for the onsite worker in the year 2030. This would be expected to remain constant as a result of 50 years of operation.

Facility Accidents. A set of potential accidents for consolidation of Pu in a new storage facility for which there may be releases of Pu that may impact onsite workers and the offsite population has been postulated. The accident consequences and risks to a worker located 1,000 m (3,280 ft) from the accident release point, the maximum offsite individual located at the site boundary, and the population located within 80 km (50 mi) of the accident release point are summarized in Table 4.2.2.9–5. For the set of accidents analyzed, the maximum number of cancer fatalities in the population within 80 km (50 mi) would be 0.027 at NTS for the beyond design basis earthquake accident scenario with an estimated probability of 1.0×10^{-7} per year (that is, probability of severe earthquake occurring is estimated to be about 1.0×10^{-5}, once in 100,000 years, multiplied by a damage and release probability of 0.01). The corresponding 50-year facility lifetime risk from the same accident scenario for the population, maximum offsite individual, and worker at 1,000 m (3,280 ft), would be 1.4×10^{-7}, 1.3×10^{-9}, and 7.3×10^{-8}, respectively. The maximum population 50-year facility lifetime risk would be 9.4×10^{-5} (that is, one fatality in about 540,000 years) at NTS for the PCV penetration by corrosion accident scenario with a probability of 0.064 per year. The corresponding maximum offsite individual and worker 50-year facility lifetime risks would be 9.1×10^{-7} and 3.9×10^{-5}, respectively. Section M.5 presents additional facility accident data and summary descriptions of the accident scenarios identified in Table 4.2.2.9–5.

Involved workers, those that would work in the facilities associated with the proposed action, may be subject to injury and, in some cases, fatality as a result of potential accidents. The locations of workstations, number of workers, personnel protective features, engineered safety features, and other design details affect the extent of worker exposures to accidents. Certain accidents such as fires, explosions and criticality could cause fatalities to workers close to the accident. Prior to construction of a new or modification of an existing facility, DOE Orders require detailed safety analyses to assure that facility designs and operating procedures limit the number of workers in hazardous areas and minimize risk of injury or fatality in the event of an accident.

Collocation Alternative

This section includes a description of radiological and hazardous chemical releases and the associated impacts resulting from either normal operation or accidents involved with the consolidation of Pu storage and collocation with HEU storage facilities at NTS. This storage would take place in either the modified P-Tunnel drifts or in a new collocated Pu and HEU storage facility.

Normal operation under either the modified P-Tunnel option or the new collocated storage facility option at NTS would result in impacts that are within applicable regulatory limits.

Involved workers, those that would work in the facilities associated with the proposed action, may be subject to injury and, in some cases, fatality as a result of potential accidents. [Text deleted.] The locations of workstations, number of workers, personnel protective features, engineered safety features, and other design details affect the extent of worker exposures to accidents. Certain accidents such as fires, explosions and criticality could cause fatalities to workers close to the accident. Prior to construction of a new or modification of an existing facility, DOE Orders require detailed safety analyses to assure that facility designs and operating procedures limit the number of workers in hazardous areas and minimize risk of injury or fatality in the event of an accident.

Table 4.2.2.9–5. Consolidation Alternative (New Storage Facility) Accident Impacts at Nevada Test Site

	Worker at 1,000 m		Maximum Offsite Individual		Population to 80 km		
Accident Description	Risk of Cancer Fatality (per 50 yr)[a]	Probability of Cancer Fatality[b]	Risk of Cancer Fatality (per 50 yr)[a]	Probability of Cancer Fatality[b]	Risk of Cancer Fatalities (per 50 yr)[a]	Number of Cancer Fatalities[c]	Accident Frequency (per yr)
PCV puncture by forklift	$9.0x10^{-8}$	$3.0x10^{-6}$	$2.1x10^{-9}$	$7.0x10^{-8}$	$2.2x10^{-7}$	$7.2x10^{-6}$	$6.0x10^{-4}$
PCV breach by firearms discharge	$5.3x10^{-9}$	$3.0x10^{-7}$	$1.2x10^{-10}$	$7.0x10^{-9}$	$1.3x10^{-8}$	$7.2x10^{-7}$	$3.5x10^{-4}$
PCV penetration by corrosion	$3.9x10^{-5}$	$1.2x10^{-5}$	$9.1x10^{-7}$	$2.9x10^{-7}$	$9.4x10^{-5}$	$3.0x10^{-5}$	0.064
Vault fire	$3.8x10^{-8}$	$7.6x10^{-3}$	$7.3x10^{-10}$	$1.5x10^{-4}$	$7.6x10^{-8}$	0.015	$1.0x10^{-7}$
Truck bay fire	$2.1x10^{-9}$	$4.2x10^{-4}$	$4.9x10^{-11}$	$9.7x10^{-6}$	$5.1x10^{-9}$	$1.0x10^{-3}$	$1.0x10^{-7}$
Spontaneous combustion	$2.1x10^{-11}$	$6.0x10^{-7}$	$4.9x10^{-13}$	$1.4x10^{-8}$	$5.1x10^{-11}$	$1.5x10^{-6}$	$7.0x10^{-7}$
Explosion in the vault	$4.9x10^{-9}$	$9.9x10^{-4}$	$1.1x10^{-10}$	$2.3x10^{-5}$	$1.2x10^{-8}$	$2.4x10^{-3}$	$1.0x10^{-7}$
Explosion outside of vault	$2.3x10^{-11}$	$4.5x10^{-6}$	$5.2x10^{-13}$	$1.0x10^{-7}$	$5.4x10^{-11}$	$1.1x10^{-5}$	$1.0x10^{-7}$
Nuclear criticality	$1.5x10^{-11}$	$3.1x10^{-6}$	$3.3x10^{-13}$	$6.5x10^{-8}$	$3.5x10^{-12}$	$6.9x10^{-7}$	$1.0x10^{-7}$
Beyond design basis earthquake	$7.3x10^{-8}$	0.015	$1.3x10^{-9}$	$2.6x10^{-4}$	$1.4x10^{-7}$	0.027	$1.0x10^{-7}$
Expected risk[d]	$4.0x10^{-5}$	–	$9.2x10^{-7}$	–	$9.5x10^{-5}$	–	–

[a] The risk values are calculated by multiplying the probability of cancer fatality (for the worker at 1,000 m or the maximum offsite individual) or the number of cancer fatalities (for the population to 80 km) by the accident frequency and the number of years of operation.

[b] Increased likelihood (or probability) of cancer fatality to a hypothetical individual (a single onsite worker at a distance of 1,000 m or the site boundary, whichever is smaller or to a hypothetical individual in the offsite population located at the site boundary) if exposed to the indicated dose. The value assumes the accident has occurred.

[c] Estimated number of cancer fatalities in the entire offsite population out to a distance of 80 km if exposed to the indicated dose. The value assumes the accident has occurred.

[d] Expected risk is the sum of the risks for each accident over the 50-year lifetime of the facility.

Note: All values are mean values.

Source: Calculated using the source terms in Tables M.5.2.1.1–5 and M.5.2.1.1–6 and the MACCS computer code.

Modify Existing Tunnel Drifts and Construct New Material Handling Building at the P-Tunnel

Normal Operation. There would be no radiological releases during the construction of a new, but larger (than for consolidation) material handling building or from modifying P-Tunnel drifts at NTS. Worker exposures to material potentially contaminated with radioactivity (for example, from construction activities involved with existing contaminated soil) would be limited to assure that doses are maintained ALARA. Toward this end, construction workers would be monitored as appropriate. Limited hazardous chemical releases are anticipated as a result of construction activities. However, concentrations would be within the regulated exposure limits. During normal operation, there would be both radiological and hazardous chemical releases to the environment as well as direct in-plant exposures. The resulting doses and potential health effects to the public and workers are described below.

Radiological Impacts. Radiological impacts to the public resulting from the normal operation of the modified P-Tunnel drifts and the associated handling building at NTS are included in the information presented in Table 4.2.2.9–1. The impacts from all site operations are also given in the table. To put operational doses into perspective, comparisons with natural background radiation doses are also included in the table. Similar information regarding radiological impacts to workers is given in Table 4.2.2.9–2. [Text deleted.]

The dose to the MEI due to annual storage operation in the P-Tunnel and handling building would be $5.6x10^{-6}$ mrem. From 50 years of operation, the corresponding risk of fatal cancer to this individual would be $1.4x10^{-10}$.

The impacts to the average individual would be less. As a result of storage operations in the year 2030, the population dose would be 1.7×10^{-6} person-rem. The corresponding number of fatal cancers in this population due to 50 years of operation would be 4.3×10^{-8}.

The dose to the MEI due to annual total site operations is within the radiological limits specified in NESHAPS (40 CFR 61, Subpart H) and DOE Order 5400.5, and would be 4.2×10^{-3} mrem. From 50 years of operation, the corresponding risk of fatal cancer to this individual would be 1.0×10^{-7}. The impacts to the average individual would be less. This activity would be included in a program to ensure that doses to the public are ALARA. As a result of total site operation in the year 2030, the population dose would be within the limit in proposed 10 CFR 834 and would be 3.7×10^{-3} person-rem. The corresponding number of fatal cancers in this population due to 50 years of operation would be 9.3×10^{-5}.

Doses to onsite workers due to normal operations are given in Table 4.2.2.9–2. Included are involved workers directly associated with the modified P-Tunnel drifts and handling building, workers who are not involved with the modified P-Tunnel drifts and handling building, and the entire workforce at NTS. All doses fall within regulatory limits and administrative control levels. The associated risks and numbers of fatal cancers among the different workers from 50 years of operation are included in the table.

Hazardous Chemical Impacts. Hazardous chemical impacts to the public and to the onsite worker resulting from the normal operations of the collocated storage facility in the P-Tunnel at NTS are presented in Table 4.2.2.9–3.

The HI to the MEI of the public is 2.8×10^{-6}, and the cancer risk is 4.1×10^{-9} as a result of operation of the collocated storage facilities in the year 2030. The HI and cancer risk would remain constant over 50 years of operation, because exposures would be expected to remain the same. The total site operation in P-Tunnel would result in an HI of 2.8×10^{-6} and a cancer risk of 4.1×10^{-9} for the MEI in the year 2030. This would be expected to remain constant as a result of 50 years of operation.

The HI to the onsite worker at P-Tunnel would be 5.6×10^{-4}, and the cancer risk is 6.4×10^{-6} as a result of operation of the collocated storage facility in the P-Tunnel at NTS in the year 2030. The HI and cancer risk would remain constant over 50 years of operation, because exposures would be expected to remain the same. The total site operation including the consolidated facility would result in an HI of 5.6×10^{-4} and a cancer risk of 6.4×10^{-6} for the onsite worker in the year 2030. This would be expected to remain constant as a result of 50 years of operation.

Facility Accidents. A set of potential accidents for modified P-Tunnel and collocated Pu and HEU storage facilities for which there may be releases of Pu or uranium that may impact onsite workers and the offsite population has been postulated. The consequences and risks of potential accidents that release both Pu and HEU would be bounded by the impacts associated with Pu. The accident consequences and risks to a worker located 1,000 m (3,280 ft) from the accident release point, the maximum offsite individual located at the site boundary, and the population located within 80 km (50 mi) of the accident release point are summarized in Table 4.2.2.9–6. For the set of accidents analyzed, the maximum number of cancer fatalities in the population within 80 km (50 mi) would be 5.3×10^{-4} at NTS for the truckbay fire accident scenario with a probability of 1.0×10^{-7} per year. The corresponding 50-year facility lifetime risk from the same accident scenario for the population, maximum offsite individual, and worker at 1,000 m (3,280 ft), would be 2.7×10^{-9}, 3.6×10^{-10}, and 2.1×10^{-9}, respectively. The maximum population 50-year facility lifetime risk would be 5.1×10^{-5} (that is, one fatality in about 1,000,000 years) at NTS for the PCV penetration by corrosion accident scenario with a probability of 0.064 per year. The corresponding maximum offsite individual and worker 50-year facility lifetime risks would be 6.9×10^{-6} and 4.0×10^{-5}, respectively. Section M.5 presents additional facility accident data and summary descriptions of the accident scenarios identified in Table 4.2.2.9–6.

Construct New Plutonium and Highly Enriched Uranium Storage Facilities

Normal Operation. There would be no radiological releases during the construction of a new collocated storage facility at NTS. Worker exposures to material potentially contaminated with radioactivity would be limited to assure that doses are maintained ALARA. Toward this end, construction workers would be monitored as appropriate. Limited hazardous chemical releases are anticipated as a result of construction activities. However, concentrations would be within the regulated exposure limits. During normal operation, there would be both radiological and hazardous chemical releases to the environment as well as direct in-plant exposures. The resulting doses and potential health effects to the public and workers are described below.

Radiological Impacts. Radiological impacts to the public resulting from the normal operation of the new collocated storage facility at NTS are included in the information presented in Table 4.2.2.9–1. The impacts from all site operations are also given in the table. To put operational doses into perspective, comparisons with natural background radiation doses are also included in the table. Similar information regarding radiological impacts to workers is given in Table 4.2.2.9–2. [Text deleted.]

The dose to the MEI from the annual storage operations in the new storage facility would be 1.3×10^{-6} mrem. For 50 years of operation, the corresponding risk of fatal cancer to this individual would be 3.2×10^{-11}. The impacts to the average individual would be less. As a result of storage operation in the year 2030, the population dose would be 2.6×10^{-6} person-rem. The corresponding number of fatal cancers in this population from 50 years of operation would be 6.5×10^{-8}.

Doses and associated health risks to the public from total site operations are virtually the same whether storage is in the new storage facility or in the modified P-Tunnel drifts (Table 4.2.2.9–1). This is because the storage operations contribute negligibly to the total offsite doses.

Doses to onsite workers due to normal operations are given in Table 4.2.2.9–2. All doses fall within regulatory limits and administrative control levels. The associated risks and numbers of fatal cancers among the different workers from 50 years of operation are included in the table. Dose to individual workers would be kept low by instituting badged monitoring and ALARA programs and also workers rotations. As a result of the implementation of these mitigation measures, the actual number of fatal cancers calculated would be lower for the operation of this facility.

Hazardous Chemical Impacts. Hazardous chemical impacts to the public and to the onsite worker resulting from the normal operations of the new consolidation of Pu storage and collocation with HEU storage facilities at NTS are presented in Table 4.2.2.9–3. The impacts from all site operations, including the consolidation of Pu storage and collocation with HEU storage facilities, are also included in this table. Total site impacts, which include the No Action impact plus the facility impacts, are provided. All analyses to support the values presented in this table are provided in Section M.3

The HI to the MEI of the public is 4.2×10^{-6}, and the cancer risk is 4.1×10^{-9} as a result of operation of the new consolidation of Pu storage and collocation with HEU storage facilities in the year 2030. The HI and cancer risk would remain constant over 50 years of operation, because exposures would be expected to remain the same. The total site operation, including the new facility, would result in an HI of 4.2×10^{-6} and a cancer risk of 4.1×10^{-9} for the MEI in the year 2030. This would be expected to remain constant as a result of 50 years of operation.

The HI to the onsite worker would be 7.2×10^{-4}, and the cancer risk is 6.4×10^{-6} as a result of operation of the new consolidation of Pu storage and collocation with HEU storage facilities in the year 2030. The HI and cancer risk would remain constant over 50 years of operation, because exposures would be expected to remain the same. The total site operation, including the new facility, would result in an HI of 7.2×10^{-4} and a cancer risk of 6.4×10^{-6} for the onsite worker in the year 2030. This would be expected to remain constant as a result of 50 years of operation.

Facility Accidents. A set of potential accidents for a new storage facility for collocated Pu and HEU for which there may be releases of Pu or HEU that may impact onsite workers and the offsite population has been postulated. The consequences and risks of potential accidents that release both Pu and HEU would be bounded by the impacts associated with Pu. The accident consequences and risks to a worker located 1,000 m (3,280 ft) from the accident release point, the maximum offsite individual located at the site boundary, and the population located within 80 km (50 mi) of the accident release point are summarized in Table 4.2.2.9–7. For the set of accidents analyzed, the maximum number of cancer fatalities in the population within 80 km (50 mi) would be 0.027 at NTS for the beyond design basis earthquake accident scenario with an estimated probability of 1.0×10^{-7} per year (that is, probability of severe earthquake occurring is estimated to be about 1.0×10^{-5}, once in 100,000 years, multiplied by a damage and release probability of 0.01). The corresponding 50-year facility lifetime risk from the same accident scenario for the population, maximum offsite individual, and worker at 1,000 m (3,280 ft), would be 1.4×10^{-7}, 1.3×10^{-9}, and 7.3×10^{-8}, respectively. The maximum population 50-year facility lifetime risk would be 9.4×10^{-5} (that is, one fatality in about 530,000 years) at NTS for the PCV penetration by corrosion accident scenario with a probability of 0.064 per year. The corresponding maximum offsite individual and worker 50-year facility lifetime risks would be 9.1×10^{-7} and 3.9×10^{-5}, respectively. Appendix M.5 presents additional facility accident data and summary descriptions of the accident scenarios identified in Table 4.2.2.9–7.

Subalternative Not Including Strategic Reserve and Weapons Research and Development Materials

If the strategic reserve and weapons R&D materials are not included, the impacts to the public and to workers from the accident-free storage activities would be reduced in proportion to the decrease in the amount of material stored. The impacts from total site operations would decrease slightly. The risks due to accidents would also tend to be lower.